



Northern States Power Company

Monticello Nuclear Generating Plant  
2807 West Hwy 75  
Monticello, Minnesota 55362-9637

October 9, 1998

10 CFR Part 50  
Section 50.73

US Nuclear Regulatory Commission  
Attn: Document Control Desk  
Washington, DC 20555

**MONTICELLO NUCLEAR GENERATING PLANT**  
Docket No. 50-263 License No. DPR-22

**LER 98-004**

**Manual Scram Inserted Following Pressure Transient**  
**Closes Air Ejector Suction Isolation Valves and Trips Offgas Recombiners**

The Licensee Event Report for this occurrence is attached. This report contains one new NRC commitment:

Training will be provided on the importance of performing thorough investigations should symptoms of a potential problem be identified. For example, all potential flow paths should be investigated if unusual odors are detected.

Please contact Tom Parker at (612) 295-1014 if you require further information.

Michael F Hammer  
Plant Manager  
Monticello Nuclear Generating Plant

c: Regional Administrator - III NRC  
Sr Resident Inspector, NRC  
NRR Project Manager, NRC  
State of Minnesota, Attn: Kris Sanda  
Attachment

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<b>NRC FORM 386</b> (4-95)					<b>U.S. NUCLEAR REGULATORY COMMISSION</b>					<b>APPROVED BY OMB NO. 3150-0104</b> <b>EXPIRES 4/30/98</b>															
<b>LICENSEE EVENT REPORT (LER)</b>															ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST: 50.0 HRS. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE INFORMATION AND RECORDS MANAGEMENT BRANCH (MNB 7714), U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON, DC 20555-0001, AND TO THE PAPERWORK REDUCTION PROJECT (3150-0104), OFFICE OF MANAGEMENT AND BUDGET, WASHINGTON, DC 20503.										
(See reverse for required number of digits/characters for each block)																									
FACILITY NAME (1) <b>MONTICELLO NUCLEAR GENERATING PLANT</b>										DOCKET NUMBER (2) <b>05000 - 263</b>					PAGE (3) <b>1 OF 7</b>										
TITLE (4) <b>Manual Scram Inserted Following Pressure Transient Closes Air Ejector Suction Isolation Valves and Trips Offgas Recombiners</b>																									
EVENT DATE (5)					LER NUMBER (6)					REPORT DATE (7)					OTHER FACILITIES INVOLVED (8)										
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	MONTH	DAY	YEAR	FACILITY NAME					DOCKET NUMBER											
09	09	98	98	004	00	10	09	98						05000											
OPERATING MODE (9)					THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more) (11)																				
POWER LEVEL (10)					20.402(b)					20.405(c)					50.73(a)(2)(iv)					73.71(b)					
100 %					20.405(a)(1)(i)					50.36(c)(1)					50.73(a)(2)(v)					73.71(c)					
					20.405(a)(1)(ii)					50.36(c)(2)					50.73(a)(2)(vii)					OTHER					
					20.405(a)(1)(iii)					50.73(a)(2)(i)					50.73(a)(2)(viii)(A)					(Specify in Abstract below and in Text, NRC Form 386A)					
					20.405(a)(1)(iv)					50.73(a)(2)(ii)					50.73(a)(2)(viii)(B)										
					20.405(a)(1)(v)					50.73(a)(2)(iii)					50.73(a)(2)(x)										
<b>LICENSEE CONTACT FOR THIS LER (12)</b>																									
NAME Tom Parker										TELEPHONE NUMBER (Include Area Code) 612-295-1014															
<b>COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)</b>																									
CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NRC		CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NRC															
X	SH	84, ISV	F052	NA																					
X	WF	PCV	W255	NA																					
<b>SUPPLEMENTAL REPORT EXPECTED (14)</b>															<b>EXPECTED SUBMISSION DATE (15)</b>										
YES (IF YES, COMPLETE EXPECTED SUBMISSION DATE)										NO															

ABSTRACT LIMIT TO 1400 SPACES, I.E., APPROXIMATELY 15 SINGLE-SPACED TYPEWRITTEN LINES) (16)  
 NCR FORM 386 (4-95)

A rapid recombination of hydrogen and oxygen in the Offgas System caused a pressure transient that closed the isolation valves between the main condenser and the air ejectors. The offgas recombiners tripped at the same time. With no apparent offgas removal means, operations personnel reduced power and subsequently manually scrambled the reactor.

The rapid recombination of hydrogen and oxygen was caused by a high temperature in an Offgas System valve. The high temperature was caused by valve seat leakage which self-ignited the hydrogen and oxygen. The burning of hydrogen and oxygen on the low pressure side of the valve caused a rise in the temperature of the valve body, which initiated the rapid recombination of hydrogen and oxygen on the high pressure side of the valve seat.

The valve seat was replaced, as was the valve seat of the similar valve on the other train. Several operating procedures were changed; temporary instrumentation was added; and extensive testing was performed. Training will be provided on the importance of performing thorough investigations should symptoms of a potential problem be identified. During subsequent piping inspections, no damage was found from the pressure transient.

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NRC FORM 366A COMMISSION (5-92)		U.S. NUCLEAR REGULATORY		APPROVED BY OMB NO. 3150-0104 EXPIRES 5/31/95	
<b>LICENSEE EVENT REPORT (LER)</b> <b>TEXT CONTINUATION</b>				ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST: 50.0 HRS. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE INFORMATION AND RECORDS MANAGEMENT BRANCH (MNBB 7714), U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON, DC 20555-0001, AND TO THE PAPERWORK REDUCTION PROJECT (3150-0104), OFFICE OF MANAGEMENT AND BUDGET, WASHINGTON, DC 20503.	
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### Conditions Prior to the Event

On August 30, 1998, the plant returned to service following a brief outage to repair equipment not related to this event.

On September 2, 1998, an unusual odor, possibly from something over-heating, was noticed in the offgas recombiner pump room. Engineering and operations personnel attempted unsuccessfully to determine the source of the odors throughout the rest of the week.

On September 9, 1998, the plant was operating at 100% power.

### Description

On September 9, 1998, at approximately 0510, several annunciators alerted operators to the following events:

The air ejector suction isolation valves (AO-1083A, 1083B, 1084A and 1084B)<sup>1</sup> closed.

The operating offgas recombiner<sup>2</sup> (Train B) tripped.

The standby offgas recombiner (Train A) tripped.

The air ejector suction isolation valves are located between the main condenser and the air ejectors (See attached figure). The offgas recombiners are located downstream of the air ejectors and function to recombine hydrogen and oxygen gases.

Control room operators initiated a rapid power reduction within 20 seconds following the above events.

Three signals can cause a closure of the air ejector suction isolation valves: low main steam pressure, high offgas pressure and high offgas temperature. Since neither the high pressure nor the high temperature annunciators were in alarm and main steam

<sup>1</sup> EIIS Component Code: ISV, EIIS System Code: SH

<sup>2</sup> EIIS Component Code: RCB

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pressure had not decreased, the lead control room operator believed that the air ejector isolation was caused by a spurious signal. After obtaining concurrence from the shift supervisor, the lead control room operator reset the air ejector isolation logic. This re-opened the air ejector suction isolation valves.

At 0512, the air ejector suction isolation valves automatically closed again. This time, the high offgas pressure annunciator was in alarm. With a confirmatory signal present, operating procedures do not allow resetting the air ejector isolation logic at power. With no apparent means of removing offgas from the main condenser, the shift supervisor ordered a manual reactor scram to be inserted at 0531. Following the scram, leakage through the air ejector suction isolation valves was observed.

The recombiner room is a locked high radiation area at power. Operations personnel enter this area once a month. No entry was made into this area between September 2, 1998 and September 9, 1998. On September 10, 1998, plant personnel entered the recombiner room and discovered: 1) the same odor that had been present in the recombiner pump room and 2) paint on the valve body of PCV-7496B<sup>3</sup> was discolored.

The offgas piping was inspected for pressure boundary damage. No pressure boundary damage was found.

### Cause

Seat leakage on PCV-7496B was determined to be the cause of the event. The pressure on the high pressure side of the seat was between 12 to 13.5 psia with 1 to 2 psia on the low pressure side. It is believed that around September 2, 1998, the seat leakage on PCV-7496B self-ignited causing a stable bum of hydrogen and oxygen on the low pressure side of the valve seat. Hydrogen and oxygen gases are known to self-ignite when rapidly expanded. This hydrogen/oxygen bum caused the valve body to heat and the paint on the exterior of the valve body to release odors which were noted by operations personnel. Ventilation pressure differences caused the odors to travel through floor drains to the recombiner pump room which is regularly inspected by operations personnel.

<sup>3</sup> EIS Component Code: PCV, EIS System Code: WF

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The temperature of a section of the valve in contact with gases on the upstream side of the valve seat eventually reached the spontaneous ignition temperature for hydrogen and oxygen gases. At 0509, a rapid recombination of hydrogen and oxygen gases occurred, causing an extremely short duration pressure transient. The pressure transient caused instrumentation: 1) to trip both offgas recombiners and 2) to initiate an air ejector isolation.

After the air ejector suction isolation valves were reopened, additional hydrogen and oxygen gases were sent toward the offgas recombiners. At 0512, when these gases came in contact with PCV-7496B, a second rapid recombination of hydrogen and oxygen gases occurred. The resultant pressure transient caused instrumentation to initiate a second air ejector isolation.

As the air ejector suction isolation valves were closing, additional hydrogen and oxygen reached PCV-7496B, causing a third pressure transient at 0513. No additional pressure transients occurred as the valve body cooled below the spontaneous ignition temperature.

An instrument air leak was found on one of the air ejector suction isolation valve air actuators. This leakage caused a reduction in the closing thrust which resulted in the indicated valve leakage.

#### Analysis of Reportability

This report is being submitted per 10 CFR 50.73(a)(2)(iv), since a manual actuation of the reactor protection system occurred that was not part of a pre-planned sequence.

#### Safety Significance

The manual scram occurred without further complication.

The function of the air ejector suction isolation valves is to isolate the hydrogen and oxygen in the main condenser from the Offgas System. However, the leakage

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observed through the air ejector isolation valves was not a safety concern, since the Offgas System is designed to withstand a rapid recombination event.

This event caused damage to the external coating and the valve internals of PCV-7496B. This valve does not perform a safety function.

This event had no effect on the offsite releases of radioactivity and, therefore, had no effect on the health and safety of the public.

### Actions

The leaking valve seat on PCV-7496B was reworked as well as the similar valve in the redundant train.

Temporary instrumentation was added to measure the temperature of the valve body of PCV-7496A and B during power operations and record system pressure. An alarm was added in the control room to alert operators of temperature increases.

The following procedural changes have been made:

Alarm Response Procedure 7-B-13 has been changed to: 1) alert operators that valid air ejector isolations may occur without either the high offgas temperature or the high offgas pressure annunciator alarming, and 2) identify alternate confirmatory indications of hydrogen and oxygen recombination outside the recombiners.

Operations Manual Section B.7.2.1-05.03, Stopping Off-gas Recombination at the Recombiner Inlet or Bypass Return, was written to provide guidance to operations on the new temporary instrumentation that was installed.

Operation Manual Section B.6.3-05, Steam Jet Air Ejector Suction Auto Isolation, was revised to provide 1) prompt closure of the manual air ejector isolation valves and 2) continued supply of steam to the air

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ejectors to reduce the likelihood of hydrogen and oxygen gas recombination during the isolation.

Training will be provided on the importance of performing thorough investigations should symptoms of a potential problem be identified. For example, all potential flow paths should be investigated if unusual odors are detected.

The air leak was repaired on the air ejector suction isolation valve actuator.

Internal offgas piping samples were analyzed to determine if the recombiner catalyst had migrated outside the offgas recombiner. No migrated catalyst was found.

#### Failed Component Identification

Air Ejector Suction Isolation Valves: Continental Butterfly Valves, Model 7710

Air Ejector Suction Isolation Valve Operators: Fisher Diaphragm Operators, Model 656-60

PCV-7496B: WKM, Pressure Control Valve Model, 70-28-1DRT.

#### Similar Events

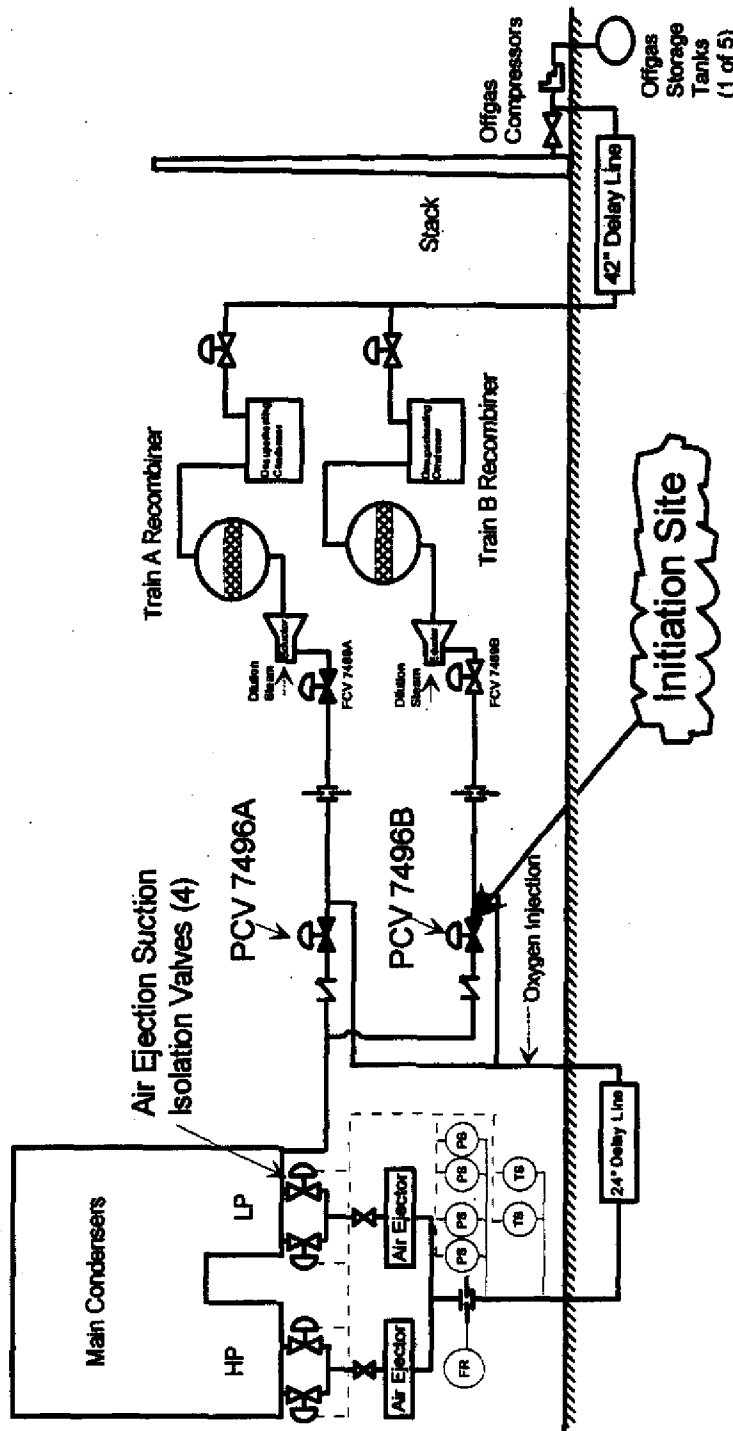
In 1974, similar events were caused by the migration of offgas recombiner catalyst into the offgas piping.

# LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

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## Simplified Drawing of the Offgas System



Notes:  
PS = Pressure Switch  
FR = Flow Recorder  
TS = Temperature Switch



# REGULATORY INFORMATION DISTRIBUTION SYSTEM (RIDS)

ACCESSION NBR: 9810150306 DOC. DATE: 98/10/09 NOTARIZED: NO DOCKET #  
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 AUTH. NAME: HAMMER, M. F. AUTHOR AFFILIATION: Northern States Power Co.  
 RECIP. NAME: RECORDS MANAGEMENT BRANCH (Document Control Desk)

SUBJECT: ~~Removal LER 98-004-00~~, manual scram inserted following pressure transient closes air ejector suction isolation valves & trips offgas recombiners. LER contains listed commitment.

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